MONTHLY WEATHER REVIEW

Editor, ALFRED J. HENRY

VOL. 57, No. 3
W. B. No. 981

MARCH, 1929

CLOSED MAY 3, 1929
ISSUED MAY 27, 1929

THE CLIMATIC RECORD OF HONDURAS

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Seasonal atmospheric pressure.—In January, Honduras lies along the northern edge of the equatorial low-pressure belt. High pressure reaches then its maximum development over much of North America, while low pressure is at its climax south of Central America. This of course gives rise to highly-developed trade winds which are dominant over the entire country, the winds being generally from a northeasterly direction.

In July, Honduras is in the midst of a low-pressure trough with a barometric pressure of about 29.9 inches while centrums of high pressure reach 30.2 inches in the Atlantic to the northeast and in the Pacific to the south and southwest. This produces a season of variable winds, in general on-shore along both coasts and strongly convectional in the interior and of course with significant relation to rainfall conditions.

Seasonal wind conditions.—Along the north coast the northeast trades are prevalent throughout the year but vary locally in intensity and direction, and seasonally as they are modified by adjacent conditions. During the winter they prevail over the whole country, even reaching the Pacific as dry offshore winds. In the summer months, however, a monsoon situation prevails so that the northeast trades reach a warm, low-pressure interior which induces the characteristic ascending convectional air motion.

The south coast has prevalent northeast winds from October to March and prevalent southwest winds from April to September. These opposing wind directions do not of course attain full development except at the midperiod in which each holds sway. The shift lasts from four to six weeks during which period variables prevail.

The interior is dominated by local breezes except during the season of the trades. During the period from April to September the winds are variable, being induced by unequal heating of the various slopes and inclosed valleys of a rugged landscape, as well as by the varying strengths of the opposing north coast and south coast breezes. The results are reflected in great variability of winds and rainfall and, to a lesser extent, of temperature.

Temperature conditions on the Caribbean coastal plain.—Early accounts of the temperatures along the north coast of Honduras emphasized the relations of health and well-being but failed to give exact data. There is convincing evidence that the aborigines of pre-Mayan and Mayan times considered the lowlands undesirable places in which to live. Until recently, the north coast was referred to by the native Indians as a fever zone, or even as "a zone of death."

Since 1920, temperature records have been kept by the fruit companies at a number of stations, and these records indicate that the prevalent temperatures are not very high and that in themselves they should not be held accountable for many of the discomforts commonly attributed to them.

The temperatures characteristic of the Caribbean coastal plain are typified by the data for the areas near Tela and Trujillo comprising the middle one-half of the north coast belt. During the 3-year period, 1924–1926, the lowest temperature recorded at the Maloa station of the United Fruit Co. was 62° F. (March, 1925) and the highest was 97° F. (May, 1925). At Black River station the lowest for the same period was 67° F. (February, 1924) and the highest, 99° F. (May, 1925).

The temperatures shown for the Trujillo division are the composites of the readings at several stations from Trujillo to Iriona and represent, as fairly as is possible for a short-period record, the temperatures prevalent along the northeast lowlands of Honduras. The mean annual temperature for the period, 1924–1926, was 80.8° F. February, with an average temperature of 75.7°, was the coldest month, while September, with an average of 83.3°, was the warmest.

TABLE 1.—*Caribbean coastal plain temperatures*

[In ° F.]

TRUJILLO DIVISION, HONDURAS

Month	1924		1925		1926		Monthly mean
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	
January	84	69	88	71	86	69	77.8
February	84	67	88	67	86	68	75.7
March	91	69	89	65	88	68	78.3
April	94	71	92	70	93	71	81.8
May	96	74	92	72	90	73	82.8
June	93	73	94	75	89	75	83.1
July	89	71	89	71	89	74	80.5
August	92	73	92	73	91	73	82.3
September	95	74	94	74	89	74	83.3
October	90	72	91	73	86	75	81.1
November	82	71	89	72	83	72	77.0
December	84	71	89	70	84	73	78.5
Annual mean	90	72	90	71	88	72	80.8

The records for the 4-year period 1923–1926 give a mean annual temperature of 78.4°. The results are virtually the same in the two areas, because differences in tabulating the readings are sufficient to account for the slight differences in the final figures.

Humidity on the Caribbean coastal plain.—As far as human well-being is concerned, humidity is nearly as important as temperature. The average relative humidity reported by stations in the Tela district for the 3-year period, 1924–1926, was 86 per cent and by the stations in the Trujillo district for the same period it was 83 per cent. The readings were taken rather early each morning when

the air was cool, hence the humidity recorded was probably higher than would have been the case if readings had been made nearer the noon hour. Yet the fact remains that humidity is high all along the north coast lowlands and is responsible for much of the enervating effect of the climate upon white residents in that section. Temperatures averaging around 80° with an average humidity of about 80 to 85 per cent make a combination which is a radical departure from Temperate Zone conditions, and one which must be taken into account by all who plan to develop industrial enterprises in that area.

TABLE 2.—*Relative humidity (in percentages)—The Carribean coastal plain of Honduras*

TELA DIVISION

Month	1924			1925			1926		
	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average
January	95	67	85.3	91	81	85	79	62	73
February	96	72	88	87	82	84	(1)	(1)	(1)
March	92	73	83.4	87	82	84	87	70	75
April	89	74	82	87	80	83	88	72	85
May	85	75	80	90	80	83	96	69	73
June	85	70	80	91	80	85	96	56	78
July	88	76	82	86	81	83	96	88	93
August	86	77	82	91	82	89	91	76	84
September	86	79	82	87	81	84	91	79	85
October	87	80	83	86	80	83	91	83	86
November	92	83	88	84	72	82	95	78	84
December	90	84	87	92	80	86	95	82	86
Extremes and means	96	67	83.5	92	72.	84	96	62	.....

[1] No record.

TABLE 3.—*Relative humidity—The Caribbean coastal plain of Honduras*

TRUJILLO DIVISION

Month	1924			1925			1926		
	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average
January	92	81	86	92	80	86	91	77	86
February	92	66	86	91	78	86	96	81	89
March	93	65	80	88	72	82	91	73	83
April	86	74	82	86	72	81	90	77	81
May	86	70	80	87	74	80	86	74	80
June	89	74	82	91	77	84	84	74	79
July	94	77	84	87	76	81	83	73	81
August	87	77	82	89	81	84	89	77	82
September	83	73	79	90	78	84	86	71	78
October	89	74	81	88	77	85	89	68	82
November	92	77	85	94	81	85	95	73	86
December	93	83	87	94	80	79	93	76	82
Annual	93	65	83	94	72	83	96	68	82

Temperatures in the interior highlands.—The only early temperature records available for interior Honduras are those which were kept at Tegucigalpa by Dr. R. Fritzgartner in 1888 and 1889 and published by him in the weekly periodical, Honduras-Progress, for those years. For the 2-year period as published, the average annual temperature was 72°, the average maximum temperature was 81°, and the average minimum temperature was 64°. May was the warmest month with an average temperature of 76.2°, and December the coldest month, temperature 66.1°.

TABLE 4.—*Average monthly temperatures at Tegucigalpa*

[1888 (°F.)]

January	68.01	May	72.88	September	73.51
February	70.78	June	74.98	October	71.86
March	73.38	July	73.88	November	71.13
April	74.42	August	72.88	December	66.10

Average maximum temperature=80.57°.
Average minimum temperature=63.95 °.
Average annual temperature=72.26°.

TABLE 5.—*Range of temperature at Tegucigalpa, 1888–89*

[°F.]

	January	February	March	April	May	June	July	August	September	October	November	December	Extreme
Lowest temperature	51	52	55	56	61	63	62	62	61	61	59	50	50
Highest temperature	82	88	88	90	90	86	84	84	85	87	82	81	90
Extreme range	31	36	33	34	29	23	22	22	24	26	23	31	40

The record for Tegucigalpa is considered to be fairly representative for interior locations of about 3,000 feet altitude. It is quite clear that December to February is the coldest period and that the warmest period lasts from April to early June. The reasons for this seasonal distribution of temperature are chiefly twofold, viz, the cold period is a response to the low altitude of the sun at that season and the influence of the northern winter extending, though faintly, into Central America; the warm period is the result of the zenith position of the sun, together with relatively clear skies and a dry terrain. As the rainy season advances, cloudiness increases, insolation upon the land surface decreases, evaporation is accentuated by the greater abundance of available moisture, and lower temperatures result.

Local differences in temperature are great, induced by differences in altitude, exposures on different slopes, and differences in humidity conditions. On some of the interior, mountain-inclosed basins where during much of the year desert conditions prevail, the maximum temperatures not infrequently exceed 100°. Along the lower slopes north of the San Juancito Range, maximum temperatures of 110° have been reported. In the San Juancito Mountains at about 6,000 feet, the maximum temperature reported is 85° and the minimum is 38°.

The office and camp of the New York and Honduras Rosario Mining Co. are located on the east slope of the San Juancito Mountains at an altitude of 5,000 feet. The mountains rise about 2,500 feet higher, while eastward the slopes are precipitous to the valley floor which lies at a little less than 3,000 feet. The warmest months as reported from the records at the camp, are those of the dry period, March to June. During that season the temperature range is from a minimum of about 58° to a maximum of 80°, although occasionally 85° is reached. From June to November slightly lower temperatures prevail but the difference is not marked. From November to March a noticeable decrease is experienced, the average minimum temperatures being 50°–55°, and on rare occasions dropping as low as 46°. During that season the average maximum is around 70°.

Records for higher altitudes are wanting. Some of the natives claim that light snow flurries have occurred on the summits of the San Juancito and Selaque Mountains but the truth of these statements is open to question.

Temperatures on the Pacific coastal plains.—No reliable records of temperature are known for the Pacific coastal plain of Honduras. It is generally recognized that the temperatures are similar to those of the north coast, but that the humidity is much lower and the alternation of land and sea breezes is more pronounced, thus giving rise to pleasant and bracing weather conditions.

AMOUNT AND DISTRIBUTION OF RAINFALL

General considerations.—A general summary of the rainfall situation of Honduras gives the contrasting conditions which prevail in the three principal physiographic regions. Along the south coast the dry season lasts from December to March, inclusive. The season is truly dry for in many years no rain whatever falls during

this period. Winds are dominantly from the northeast, brilliant sunshine is the rule, and the weather as a whole is agreeable and stimulating. This is the *Verano* season, a period of such dryness that it becomes a common rest period for most vegetation. Deciduous trees shed their leaves, giving the landscape toward the close of the season almost a desert-like appearance. Then follows the rainy season, the *Invierno*, quickening vegetation into life almost as by magic, and reaching its culmination in June. Several weeks of less rain then ensue, giving rise to a short, drier season known as the *Veranillo*, after which heavier rains again set in and then gradually taper off until November when the real dry season, the *Verano*, begins.

In the interior highlands the rainfall varies with altitude. At altitudes below 4,000 feet but little rain falls from December to March, nevertheless, the season is not without some rain. At the higher altitudes, especially above 6,000 feet, showers are frequent even during this season. April usually marks the beginning of the rainy season, June its climax, and November its tapering off into the *Verano*, or major dry season. Some of the inclosed basins receive rain only during the height of the rainy season, and are almost rainless for from six to eight months of the year. On the other hand, the highest mountain summits are bathed in showers of varying intensities the year round which lead to vegetation caps of jungle type. Great local variations within short distances, either horizontally or vertically, are characteristic of the interior.

In the area of the Caribbean coastal plain heavy rainfall and high humidity are typical. Some rain falls every month, but March marks the middle of a 3-month period of slight precipitation, while the climaxes of the rainy season occur in the height of the summer and in November. The *Veranillo* usually occurs in September or October but merely marks a period when the rains are less than during the preceding and succeeding weeks. November is the month of maximum rainfall over this region, followed by a very sharp decline in December.

During recent years the large American fruit companies operating in the Caribbean area have begun to keep daily rainfall records, a practice which eventually will furnish a safe basis for deductions regarding causal and distributional relations. Except for a few places such records were not begun until 1923 and 1924, hence at present only short-term records are available for much of the area. In the interior and along the south coast, detailed records are lacking, and so only brief and incomplete analyses of conditions can be made for those regions.

Rainfall of the Pacific coastal plain.—The only known detailed record for this region is a series of observations made by Mr. J. E. Foster of Nacaome [1] for the years 1910 to 1915, given herewith:

TABLE 6.—*Rainfall record at Nacaome, Honduras*

[Inches]

Month	1910	1911	1912	1913	1914	1915	Average
April	1.0	0.2	0.0	3.0	6.5	0.3	1.83
May	7.5	14.6	2.3	14.6	1.5	9.7	8.37
June	11.3	13.6	14.5	20.3	7.7	15.0	13.73
July	9.9	2.0	2.8	2.4	1.0	3.7	3.63
August	7.3	6.5	4.8	9.4	.3	(a)	5.66
September	13.0	6.8	3.7	20.2	3.4	(a)	9.42
October	5.3	3.2	8.5	11.3	4.4	(a)	6.54
November	1.0	8.1	2.0	.0	4.8	(a)	3.18
Total	56.3	55.0	38.6	81.2	29.6		51.36

(a) No record.

[1] Foster, J. E.: "Observaciones sobre las Estaciones" Boletin de la Secretaria de Fomento, Obras Publicas, y Agricultura, vol. 5, p. 45. Tegucigalpa, January-March, 1916.

In the report concerning the rainfall during the years given, the dates of the earliest and the latest rains of each season were stated to be as follows:

Year	Date of first rains	Date of last rains	Remarks
1910	Apr. 16 and 17	Nov. 14 to 16	Only a few light showers in April.
1911	May 9	Nov. 20 to 21	
1912	May 14	Nov. 15	
1913	Apr. 12	Oct. 29	
1914	Apr. 29 to 30	Nov. 10	
1915	May 10		Scattered, light showers before May 10.

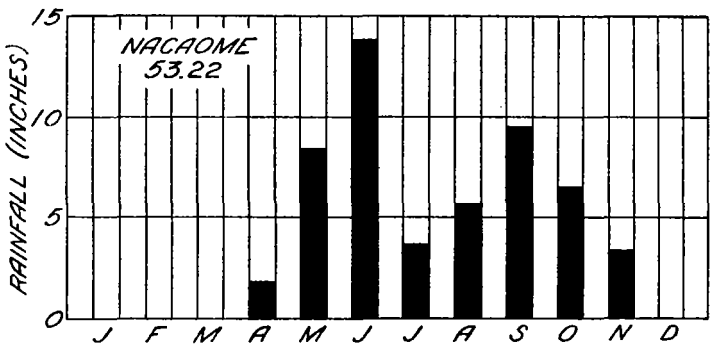

FIGURE 1.—Average monthly rainfall at Nacaome, 1910-1915

The preceding tables illustrate clearly the significance of the double movement across Honduras of the equatorial low-pressure belt and the lag of the maximum rainfall periods attending it. On the Pacific coast the *invierno* alone produces rain but is interrupted during July and August by the short season of lessened rain known there as the *Veranillo de San Juan*. This rainfall distribution is typical of the Pacific coast of Central America as far as southern Costa Rica. The principal causes of the rains appear to be the ascending air movement of the equatorial low-pressure variables augmented by the monsoon trades from the southwest.

Rainfall in the interior highlands.—The only carefully kept rainfall record known for interior Honduras is one for San Juancito reported by the New York and Honduras Rosario Mining Co. (Table 7). The gauge was presumably located near the headquarter's offices of the company at an altitude of about 5,000 feet. The record was begun in 1913 and since it has been kept consistently since that time, it has become one of sufficient duration to give it high value. The monthly rainfall, 1913–1926 is presented in the following tables and the means are graphically shown in Figure 2.

TABLE 7.—*Rainfall record at San Juancito, Honduras*

[In inches. Station at 5,000 feet altitude, facing northeast]

Month	1913	1914	1915	1916	1917	1918	1919
January	3.15	0.92	0.83	2.76	2.04	0.81	0.64
February	0.88	1.52	0.72	1.10	0.55	2.40	2.81
March	1.46	1.20	5.87	1.46	0.24	0.72	0.07
April	4.80	2.64	2.51	2.60	0.56	3.70	0.72
May	9.74	3.45	4.86	8.82	2.57	5.86	8.64
June	13.37	7.07	14.49	9.97	11.31	14.89	6.87
July	8.19	3.75	7.22	12.64	10.51	6.04	6.20
August	5.74	2.27	5.94	15.52	10.92	4.16	7.87
September	10.67	5.81	7.97	8.23	15.69	11.71	13.58
October	10.31	5.72	6.76	8.47	16.28	11.45	5.16
November	4.35	3.98	13.17	4.33	0.91	6.11	2.64
December	1.89	2.22	1.72	1.83	2.70	4.26	2.24
Total	74.55	40.55	72.06	77.73	74.28	72.11	57.44
Number days rain	168	150	172	169	159	188	184

TABLE 7.—*Rainfall record at San Juancito, Honduras*—Contd.

Month	1920	1921	1922	1923	1924	1925	1926
January	2.24	3.43	1.45	2.22	2.29	2.27	1.00
February	0.80	0.86	1.49	0.19	2.17	0.30	0.57
March	1.52	0.97	1.24	0.29	0.19	0.58	0.09
April	0.03	0.25	0.16	0.38	2.49	4.87	0.09
May	14.32	9.01	10.46	7.34	3.47	7.72	2.33
June	16.19	15.59	11.08	13.24	7.98	7.92	4.35
July	4.27	6.98	3.57	5.23	8.96	5.47	5.88
August	8.00	5.88	7.86	5.93	8.42	4.95	9.02
September	7.49	11.82	8.28	5.48	11.25	11.15	10.69
October	8.58	12.56	8.19	2.02	13.79	4.12	10.56
November	5.91	1.97	3.11	2.63	1.86	4.40	2.42
December	1.83	1.50	2.46	2.17	3.60	1.86	1.78
Total	71.18	70.82	59.35	47.12	66.47	55.61	48.78
Number days rain	179	193	153	164	203	200	134

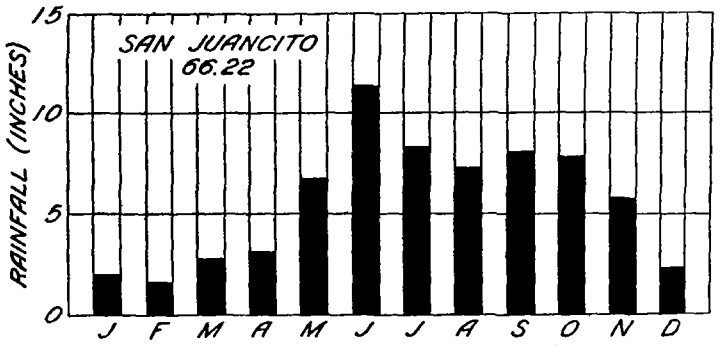

FIGURE 2.—Monthly mean rainfall for San Juancito

The mean annual rainfall for the period was 63.46 inches, and the average number of days per year when rain fell was 172.

This record shows clearly the summer rainy season which is characteristic of the interior highlands. The mean maximum occurs in June; this is followed by a poorly defined *veranillo* during July and August and that by a second, weaker maximum in September. December to April is the dry season, the *verano*, a period during which little rain falls at altitudes below 4,000 feet.

The *verano* ends in April. Toward its close the weather is the hottest of the year, the skies are clear, the sunshine brilliant. On the plateaus and higher mountain slopes the season is delightful, its charm broken to some extent however by the pall of smoke which hangs over the landscape. This is due to the fires set to the dry grass by the natives in order to reduce the numbers of ticks, the *garapatas*, which are then veritable pests for both man and beast.

Rainfall on the Caribbean coastal plain.—Rainfall records for relatively long periods are available for but three stations along the Caribbean coastal plain, viz, Cuyamel, Tela, and Trujillo. These stations are, however, so situated as to give a fairly representative section of the north coast area. Records for shorter terms are available for a number of places, and beginning with 1923 and 1924 rainfall data are being recorded at a great number of stations by the various fruit companies. In the course of a few more years data for safe deductions as to amount, distribution, and variability of rainfall in this area will thus become available.

TABLE 8.—*Rainfall record for the north coast of Honduras*

Station	Length of record	Average annual rainfall
	Years	*Inches*
Cuyamel	14	124.81
Tela	12	96.67
Trujillo	12	71.00

The rainfall is less than is ordinarily supposed to be the case. The general average annual rainfall for the three stations quoted is only 97.49 inches. Furthermore, the western part of the north coast evidently has greater rainfall than does the eastern, a situation quite in contrast to the prevalent impression held in many quarters that the northeast lowlands are literally drenched in rain. The heavier rainfall westward along the coast is accounted for by the configuration of the coast line of that section of the Bay of Honduras and the rugged terrain which rises abruptly back of the coast there. The moisture-laden northeast winds virtually converge in the vicinity of the Gulf of Amatique, Guatemala, and are forced to rise over the highland barrier, thus setting up a series of currents which result in heavy precipitation within the adjacent area. In northeastern Honduras the mountains are farther from the coast and the rainfall is therefore less concentrated on the coastal lowlands.

Seasonal distribution of rainfall along the Caribbean coast.—The percentage of the total annual rainfall which falls in each month appears to be relatively the same for the various stations along the north coast area. The dry season occurs during March, April, and May, while the remaining nine months of the year may well be called the rainy season. A well defined maximum occurs in November which in some cases accounts for 25 to 30 per cent of the year's rainfall. Late August or September is expected to bring some let-up in the rains but ordinarily the veranillo does not reach as pronounced development as it does in the south coast area or in the interior.

The record of rainfall at Tela dates back to 1914 and has been kept so faithfully that it is now one of the most valuable in Central America. The mean annual rainfall during the period 1914 to 1926 was 96.67 inches. One of the most striking characteristics brought out by this record is that of variability in annual and in monthly rainfall. During the 13-year period the total annual amounts ranged from 52.21 inches to 128.71 inches. The rainfall in 1924 was *62.42 inches greater than that of the preceding year.*

TABLE 9.—*Rainfall record at Tela, Honduras*

[Inches]

Month	1914	1915	1916	1917	1918	1919	1920
January	8.59	5.65	4.69	3.21	9.10	11.26	12.47
February	4.17	6.87	6.17	8.01	6.22	6.51	3.45
March	13.66	12.41	6.52	7.25	.70	1.52	9.72
April	3.03	4.82	4.13	.77	5.07	6.52	3.31
May	3.30	2.33	4.75	5.32	3.80	.50	3.20
June	3.30	5.46	2.37	7.88	11.03	8.96	3.28
July	3.04	4.02	2.69	5.35	9.71	8.65	6.89
August	5.39	13.07	3.85	9.12	13.38	9.92	5.08
September	5.91	10.07	10.53	5.27	8.65	20.78	8.16
October	9.36	26.61	13.67	11.41	10.67	12.73	6.98
November	20.25	15.55	21.73	33.47	19.79	5.88	12.83
December	4.95	18.06	6.03	11.36	23.94	29.26	8.47
Total	84.95	124.92	87.14	108.42	122.06	122.49	83.84

Month	1921	1922	1923	1924	1925	1926	Average
January	13.50	5.38	6.74	12.45	5.35	21.57	8.46
February	3.51	7.23	1.76	16.25	3.36	9.17	6.38
March	2.99	2.24	.26	2.93	.91	4.35	5.47
April	1.92	.45	.23	.68	2.02	2.69	2.81
May	2.35	1.23	1.40	2.47	4.82	8.45	2.73
June	8.69	4.79	4.92	4.80	7.86	.66	5.95
July	5.88	4.93	4.80	8.49	4.72	8.81	5.86
August	5.47	8.14	4.83	7.79	10.43	7.24	7.82
September	8.37	6.54	5.53	7.11	11.31	3.88	8.81
October	6.40	11.22	8.44	7.09	3.32	13.93	11.32
November	8.03	3.92	8.95	33.44	21.83	31.46	16.71
December	8.23	9.38	4.35	11.13	8.77	16.49	12.29
Total	75.34	65.45	52.21	114.63	84.70	128.71	94.68

Much misconception exists regarding the rainfall situation on the Caribbean coastal plain. It is commonly supposed that the rains are almost constant during the wet season and that even the dry season is characterized by rains almost daily. The popular expression, carelessly bandied about, "during the wet season it rains all the time and during the dry season, every day," summarizes the popular fallacy. It is therefore well to emphasize that even the Caribbean coast of Honduras, with an average annual rainfall in the neighborhood of 100 inches, has a remarkably high percentage of rainless days. More than 60 per cent of the days are rainless, and even on the days when rain does fall the skies are clear and the sun shines brilliantly much of the time.

The Tela district has a central location and hence is considered to be fairly representative of the north coast conditions. Monthly summaries of the records of five stations in this district for the period 1924–1926 are presented in Table 10: The average number of days with rain was only 138.4. Even November, the rainiest month, had only 19 days when some rain fell, and April averaged less than 3 rainy days for the district as a whole.

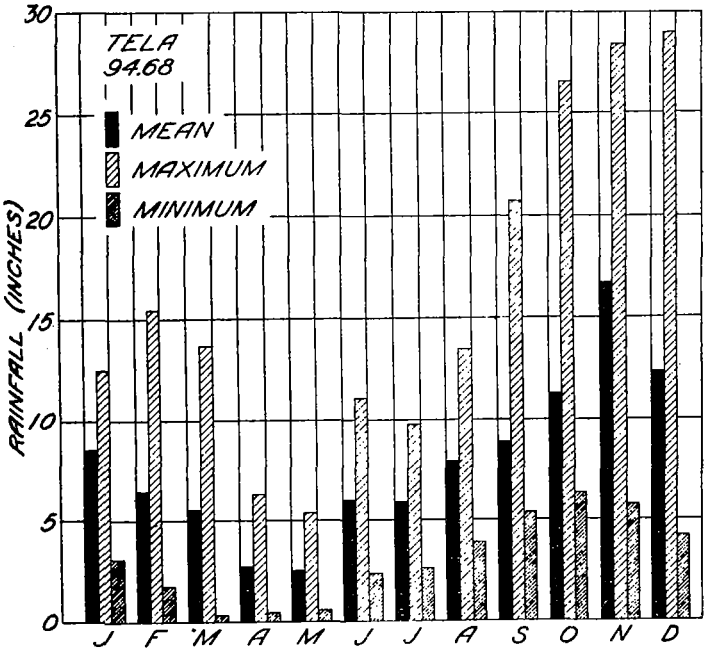

FIGURE 3.—Monthly mean, maximum, and minimum rainfall, Tela, 1914–1926

TABLE 10.—*Rainy days in the Tela District*

[Average, 1924–1926]

Month	Uluasito	Dakota	Tela	Farm 10	Progresso	District average
January	14.0	11.0	13.6	8.0	7.3	10.78
February	12.3	9.0	11.0	7.3	9.0	9.72
March	7.0	5.0	4.3	2.3	3.3	4.38
April	4.7	3.0	2.7	2.3	1.7	2.88
May	9.3	8.0	8.0	4.7	5.3	7.06
June	17.0	12.7	11.7	11.7	10.3	12.68
July	23.0	16.0	12.7	13.3	10.7	15.14
August	24.7	17.0	14.7	14.3	14.6	17.06
September	19.7	15.0	9.3	15.0	13.7	14.54
October	18.3	14.7	12.0	8.3	8.0	12.26
November	20.0	20.3	19.3	18.7	18.7	19.40
December	19.3	13.0	12.0	11.0	12.0	13.46
Year	189.3	144.7	131.3	117.9	114.6	139.36

A summary of the daily records on a weekly basis brings out the normal rainfall curve more clearly than does a summary by months. This method involved 105 records for each week distributed among the five stations, hence tends in a measure to compensate for the shortness of the period. In the graph, illustrating this summary, the climax of the *Verano* is shown as occurring about the last week in March, and of the *veranillo* in early October. The double rainy season culminating in late July and in November is also distinctly shown. A longer period of observations would undoubtedly change slightly some of the details but would probably retain the general form of the curve.

The following table gives the statistical summary upon which Figure 4 is based. From it, the rain probabilty for every week in the year can be estimated for the district as a whole, but it must be remembered that variability both with regard to place and time is so great, that here even more than is generally true, the suggested normal is an extremely unlikely occurrence. It would be very abnormal to experience the normal.

TABLE 11.—*Weekly rain probability in the Tela district*

[Based on daily rainfall records, 1924-1926]

Week	Average number rainy days	Per cent	Week	Average number rainy days	Per cent
1	3.25	46.6	27	3.27	46.6
2	3.13	44.7	28	3.60	51.4
3	1.47	20.9	29	3.73	53.3
4	2.26	32.3	30	2.87	40.9
5	2.40	34.3	31	2.93	41.9
6	5.60	51.4	32	4.67	66.7
7	1.60	22.8	33	4.87	69.5
8	2.00	28.6	34	2.67	38.1
9	2.73	39.0	35	3.86	55.2
10	1.06	15.2	36	3.40	48.6
11	1.33	19.0	37	3.53	50.5
12	.60	8.5	38	3.27	46.6
13	.00	0.0	39	3.27	46.6
14	.20	2.6	40	3.47	49.5
15	.26	3.7	41	2.60	37.1
16	1.07	15.2	42	1.80	24.7
17	1.20	17.1	43	2.93	41.9
18	.87	12.4	44	4.00	57.5
19	1.33	19.0	45	4.20	60.0
20	2.13	30.3	46	4.20	60.0
21	1.33	19.0	47	5.27	75.3
22	2.40	34.3	48	4.73	67.5
23	2.53	36.2	49	3.00	42.8
24	2.13	30.3	50	2.67	38.1
25	4.33	61.9	51	3.06	43.7
26	3.20	45.7	52	2.87	41.0

According to this record the average percentage of rainy days during the year is 38.2 for the five stations quoted as representing the Tela district.

Variability of rainfall.—The striking variability of rainfall as to time and place has already been alluded to. Instances are numerous where a rain of several inches may occur in a given locality, whereas but 2 or 3 miles distant hardly any rain falls. These local conditions are generally recognized. But seasonal and annual variability for a given locality is equally pronounced, and this condition is characteristic of the whole country rather than being unique for the Caribbean coastal plain.

The record of Tela (Table 9) for the 13-year period, 1914–1926, inclusive, gives ample evidence of annual variability. The highest yearly rainfall occurred in 1926, 128.71 inches, while the lowest, only 52.21 inches, was recorded in 1923. The dry year of 1923 was followed by 114.63 inches in 1924, thus giving an increase of 62.42 inches over the preceding year for the same place.

The monthly variability is as pronounced as is the annual. A glance at Table 12 will show some vivid illustrations of this fact. For example, March and April are presumably dry months at Tela, yet in some years March has had up to 13.66 inches and April 6.52 inches of rain, while in other years less than 0.25 inch rain has fallen during each of these months. June, ordinarily a wet month, has had as little as 0.66 inch, and November has fluctuated between 33.47 and 5.88 inches

TABLE 12.—*Monthly extremes of rainfall, Tela, 1914–1926, inclusive*

[Inches]

Month	Average	Maximum	Minimum	Number of years above or below average	
				Above	Below
January	8.46	21.57	3.21	7	6
February	6.38	16.25	1.76	5	8
March	5.47	13.66	.26	5	8
April	2.81	6.52	.23	7	6
May	2.73	8.45	.50	7	6
June	5.95	11.03	.66	5	8
July	5.86	9.71	2.60	6	7
August	7.82	13.38	3.85	6	7
September	8.81	20.78	5.27	5	8
October	11.32	26.61	6.40	5	8
November	16.71	33.47	5.88	7	6
December	12.29	29.26	4.35	4	9
Annual	99.68	124.92	52.21	6	7

SUMMARY OF THE CAUSES OF RAINFALL ON THE CARIBBEAN COASTAL PLAIN OF HONDURAS

The location of Honduras in what may be termed the border zone of the equatorial belt is largely responsible for the complexity of climatic conditions found there.

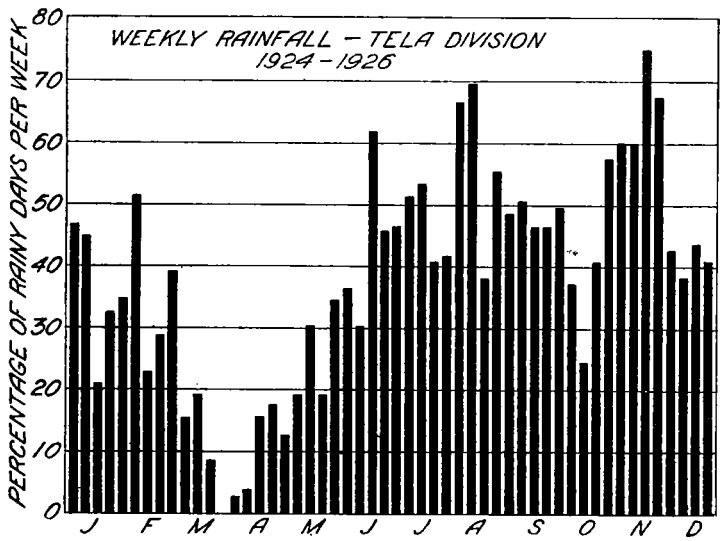

FIGURE 4.—Weekly rainfall—Tela division, 1924–1926

Seasonal variations occur, of course, with the north and south migration of the climatic belts, but variability is caused also by irregular penetration of equatorial and temperate weather conditions beyond their customary limits at various seasons. Thus at times in the winter months *northers* induced by pressure conditions in the central interior of North America sweep across the Gulf of Mexico and into the Caribbean borderlands, especially the north coast of Honduras, and give days of chilly, raw, drizzly weather. On the other hand, there are times when opposite conditions are true, and lobes of equatorial low pressure extend into the area even in the winter season. Thus Honduras, though dominated by the northeast trades, also is periodically affected by the equatorial calms, to a lesser extent by the extratropical high-pressure belt, and occasionally even feels the effect of the cyclones of the northern westerlies.

The basic causes of the rainfall on the Caribbean coastal plain of Honduras therefore appear to be:

1. The equatorial rain belt which extends across and beyond Honduras during the summer, the heavy rains lagging some weeks behind the vertical sun. This in large measure accounts for the heavy summer rainfall period.
2. The northeast trades, which, since leaving the West Indies, have traversed the warm Caribbean, bring the heavy rains of autumn, culminating in November. In that season the waters of the Caribbean are warmest and the receding sun gives rise to cooling of the land, hence maximum precipitation.
3. The "wet northers" which are produced by winds from the north after crossing the warm Gulf of Mexico.
4. Cyclonic storms which develop along border zone of high and low pressures and sometimes attain considerable violence, with resultant heavy rains.

Concomitant with these causes, consideration should also be given the narrowness of the plain, and the slopes of the adjacent border mountains. The relief undoubtedly has an important relation to the development of local convection currents and hence to local rainfall conditions. It is very possible that further study of the details of local relief may furnish the key that will account for some of the dry spots and some of the wet spots which are at present attributed entirely to variability and hence are considered to be purely accidental. There may be a reason in some instances—the story can not yet be finally told.

WEATHER ABNORMALITIES IN THE UNITED STATES

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The study of weather abnormalities has a very real attraction for many students of the weather map. I consider such studies as among the most promising that can be made especially when the much greater problem of seasonal forecasting is in view. A better understanding of the causes of the irregularities or abnormalities of the weather must form a preferred avenue of approach to the problem of long-range forecasting.

Hitherto the lack of observational data for the more remote places on the globe has been so great as to seriously handicap any organized effort to elucidate the cause or causes of weather abnormalities. While the results of the efforts herein described are negative and the paper must be considered as of an exploratory character, it is printed in the hope that it may induce similar studies for other localities in the years that are to come.

The weather of 1915 in the United States and elsewhere in North America was abnormal in several respects, especially as to the distribution of temperature and precipitation over very considerable areas. From May to September the temperature was unusually low, in fact the mean temperature for the summer months June–August was the second lowest at many stations during the last 50-odd years.

The precipitation in one or more States west of the Mississippi, almost in the center of the continent was unusually heavy with the result that disastrous floods were produced in the streams of the region and a large property loss was entailed. The number of severe hailstorms in the Plains States was unusually large and the destruction of growing crops was very great.